To: Robin, George[Robin.George@epa.gov]
From: Andrews, Kathleen@DOC
Sent: Wed 3/20/2013 9:00:11 PM
Subject: RE: For discussion

I appreciate your comments. Yes, the "bad" wells in both projects (all of our projects, of course) were identified by the amount of cement inside and outside casing. Yes, the aquifer exemption would have to be carefully thought out, and I think there's a good case for it. I interpret what I hear from others not "there would have to be a good case for it", I hear "we've found ways to avoid that for 20 years, I think we can find a way around it this time as well". I can see that obtaining water samples could be a good thing from a protective standpoint, turning an assumption into an official decision. However, it could also slow the project down by 8 months or thereabouts. I guess I'm partly getting more information to be sure that this step provides needed information, rather than just taking time, so all your expertise is appreciated.

Meanwhile, in our conversation yesterday, you mentioned that you haven't required water sampling, and I'd like to hear about ways that you have estimated salinity, or found workarounds in lieu of actual samples. And has the EPA worked up protocols for water sampling? One of the operators has begun discussions with Sclumberger regarding their sampling procedure, although their management may or may not give the go-ahead, but if we go that way, I'd be writing a protocol for the Division. It would be good to use EPA's protocol as a starting point. I come from 20 years in the environmental consulting world, so I understand the issues of purge volumes, isolating the drilling fluid from the formation fluids, matching chemistry to stratigraphy, etc. If EPA Region IX hasn't written a protocol, could you direct me to a state or EPA region who has?

When we talk, I'd like to hear about examples of pathways that aquifer exemptions have taken, both the ones that were granted and not granted. Perhaps there are others on your staff who could talk to me about how this process works? I've heard in very general terms from someone elsewhere in the Divison, but the situation is very different in SoCal, due to the amount of development here versus there.

Kathleen Andrews

Associate Oil and Gas Engineer

Division of Oil, Gas and Geothermal Resources

Cypress, California

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From: Robin, George [mailto:Robin.George@epa.gov]
Sent: Wednesday, March 20, 2013 1:03 PM
To: Andrews, Kathleen@DOC
Subject: RE: For discussion

Hi Kathleen,

If it is ok, I am under pressure on several projects, so I'll respond within your text with red so that you can get the response within that context of your text.

Then, later, I suggest another phone call.

In short, your thinking is proper – taking the logical channels and considerations which will serve toward a more expedient solution.... because, who has tons of time these days anyway?

George

George Robin (robin.george@epa.gov)

Engineer, Underground Injection Control

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San Francisco, CA 94105

From: Andrews, Kathleen@DOC [mailto:Kathleen.Andrews@conservation.ca.gov]
Sent: Wednesday, March 20, 2013 9:00 AM
To: Robin, George
Subject: RE: For discussion

Thanks for clarifying!

Yes, my diagrams show one well, but we've got several situations with numerous wells.

I have two situations of immediate concern. One is an injection project where the operator is proposing to convert two injection wells which are a couple hundred feet apart, and there are 440 wells, including about 13 injectors, within a 1/4-mile radius. We identified 79 wells in that radius that don't have adequate isolation. (yes, this kind of situation can be rather complex, requiring an examination of the cement sheaths behind the affected wells. This will help to rule-out any wells that not only provide a vertical path for fluid migration, but a tortuous path involving several zones besides the injection zone itself.) This sounds like an expensive proposition to remediate these wells, and we're aware we may already have a situation where injection is likely to be affecting the USDW. That situation is like my scenario "C" on my sketches. At the moment, the Division is on hold with our evaluation of their wells, and we are suggesting that the operator obtain water samples above the zone where the 9,000 ppm sample was obtained. (there must be a reason why the need to investigate shallower zones than a known USDW at 9,000ppm TDS. The rule of thumb is that one would expect shallower zones to also be USDWs, but additionally, a simple protective approach would be to make that assumption an official decision) This is driving me crazy, because actually there is only the one 9,000 ppm water sample, and I see no reason to suspect that there's lower salinity water between the oil-producing zone and the surface, so why we are putting the operator through the exercise of collecting water samples just seems misguided. (I would want to examine the open hole logs to see how the calculated salinity compares to the sample results for applying that accuracy to other wells & formations. This would probably be a legitimate effort and would have advantages.)

The other situation of immediate concern is like a combination of my scenarios "A" and "D" on

my sketches. There are 79 wells, two which are close to each other that are proposed for conversion from production to injection, and there are already two injectors within the ¼-mile radius. On one side of the fault, there's the situation of lower-than-10,000 ppm salinity from the producing zone to the surface, and complex geology as in "D". We're having trouble defining the base of the USDW for several reasons, including the salinity issue, discontinuous layers, and the near-vertical layers on the north side of the fault. I don't know how we would define the base of the USDW on the north side of the fault, but the way things are going, it looks like the Division would be asking the operator to collect water samples from boreholes. (again, such sampling efforts would involve well work, including perforating, extracting a representative sample, testing, plugging those perfs, then recompleting the well - - with a larger assumption that the formation water sample obtained has not been altered by previous oilfield activity.) At this field, we have recent fluid level measurements at the 7 idle wells for which we have fluid levels, the fluid levels are 49 to 2141 feet above the layer we are currently using for USDW, which is the top of a hydrocarbon producing zone. There's a shallower producing zone that extends partway across the field, just to keep things interesting! It looks to me like a perfect situation to work on an aquifer exemption, (An "aquifer exemption" is an "exemption from protection" which is the most serious action allowed within the UIC program. But indeed, an USDW containing commercial quantities of oil and hydrocarbons is essentially NOT an USDW, and so is justified in its exemption within boundaries that are sensible.... we can talk about that in the future) but everybody else seems to be pulling out every tool they can think of to avoid going down that road. We are concerned that getting the Water Board to agree to the exemption would be blocked by fear of making a decision, and fear of public scrutiny/reaction, real or imagined. (Yes, there may be fear of those things. Please consider that ultimately, the EPA must also agree and it is the EPA's decision to exempt an USDW. The EPA has much experience dealing with the public and so, our "scrutiny" will be to make sure that the Aquifer Exemption petition is backed up by sound engineering and scientific principles; one that follows the regulations and guidance; one that achieves agreement with the Regional Board; and one that can answer ANY question or concern the public may have such that the public not only understands, but hopefully agrees with the exempted area within the oilfield) A few aquifer exemptions have been pursued in the Bakersfield district, but not in living memory in our district. I'm not sure how much traction the argument that the groundwater has always been impacted from the hydrocarbon zones to the surface as evidenced by the tar seeps at the surface would get (the tar has to get from the hydrocarbon zones to the surface somehow!), but it sounds reasonable to me. (this may be true, but must be documented and well reasoned – again, that's very basic questioning to expect from Reg. Board, public, and EPA)

I'm the newest associate in the UIC group, and it's a challenge finding a path among a couple of other people with many years of experience, who are also in a 'figure these new situations a day at a time' mode. We have a new supervisor, who came from the California DTSC about two years ago. He's very bright, and learns fast, but he doesn't have a wealth of experience in injection wells, and the combination of fear of public scrutiny,(well, yes that could be quite an issue, so all the more reason to have sound bases developed for this petition – BUT, the public can be very accepting when the plain truth is presented at a "basic" level – not the "high-faluting" engineering terminology and makes good sense, which is what the engineering strives

to accomplish with those various mathematical and mechanical tools.) the fact that the Division only started tackling these injection projects in the detailed way that we are now three years ago, and a year ago started wrangling with this 10,000 ppm concept has us all a bit lost. Still, my supervisor would like me to use just our local expertise, and is discouraging me from calling Jerry Salera in Sacramento, so at the moment my talks with you and David Basinger are on the QT. I feel that getting advice from the EPA is essential, so thus I'm calling….I'm hoping we can talk again soon. (yes I agree, so we'll arrange or just talk impromptu, but again, I am pressed on that Class V Experimental Slurry Fracture project with Los Angeles, which also happens to be kind of fascinating and challenging, in a good way)

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From: Robin, George [mailto:Robin.George@epa.gov]
Sent: Wednesday, March 20, 2013 7:32 AM
To: Andrews, Kathleen@DOC
Subject: RE: For discussion

Hi Kathleen,

Well it is I who must apologize – I may have (pretty sure I did) sound a little "goofy" yesterday because I was taking one of those medicines that make one drowsy.

I finally realized that you were not talking about a single well but a field or smaller reservoir. That can become complicated very fast.

I remember discussing with your agency's Rob Habel a field that was a brain twister (especially for an alert brain) as possible communication, possible contamination pathways were making

pressure/volume analysis more critical, less determinable. So, the best approach is that of yours and many others nationwide in UIC – collaboration and communication.

Ok, I will look up some applications of pressure calculations, reference material, etc. and forward them to you.

Is Ali Khan your District Manager?

George Robin (robin.george@epa.gov)

Engineer, Underground Injection Control

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San Francisco, CA 94105

From: Andrews, Kathleen@DOC [mailto:Kathleen.Andrews@conservation.ca.gov]
Sent: Tuesday, March 19, 2013 3:31 PM
To: Robin, George
Subject: RE: For discussion

Thank you so much for your time today, and apologize for taking time away from meeting your deadline. I'm very interested in discussing further. I have a lot to learn, and would like to set up a time for another conference call.

Kathleen Andrews

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From: Robin, George [mailto:Robin.George@epa.gov]
Sent: Tuesday, March 19, 2013 2:41 PM
To: Andrews, Kathleen@DOC
Subject: RE: For discussion

http://www.epa.gov/ogwdw/uic/pdfs/Historical/techguide_uic_intro_tech_subsurf_inj_1977.pdf

From: Andrews, Kathleen@DOC [mailto:Kathleen.Andrews@conservation.ca.gov]
Sent: Tuesday, March 19, 2013 2:08 PM
To: Robin, George
Subject: FW: For discussion

Here you go:

Kathleen Andrews

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From: Andrews, Kathleen@DOC
Sent: Friday, March 15, 2013 3:36 PM
To: 'basinger.david@epa.gov'
Subject: For discussion

I found ways to sketch the background for several more of the questions that we discussed.

I'm looking forward to our discussions next week, with George and possibly folks in other regions.

Thanks in advance.

Kathleen Andrews

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